Sheet

1- a- Write down expression for the E- and H- plane patterns for a uniformly illuminated rectangular aperture.

b- For a uniformly illuminated $5\lambda * 3\lambda$ rectangular aperture with y- polarized electric field:

i-Find and sketch the field pattern in both E and H planes.

ii-Estimate the 3-dB beam width and the gain.

2-For a uniformly illuminated circular aperture ($a=3\lambda$) with y- polarized electric field:

i-Find and sketch the field pattern in both E and H planes.

ii-Estimate the 3-dB beam width and the gain.

3-For a square aperture ($5\lambda * 5\lambda$) with uniform amplitude feeding and linear phase shift $e^{jkx\sqrt{2}}$ and a square blockage ($2\lambda * 2\lambda$) in the center and the aperture electric field is polarized in y- direction. Derive expressions for the far field patterns in the x-z and y-z planes indicating the E and H planes.

4- For a uniform illumination rectangular aperture, if the E field is y polarized, the 3d beam width in the H plane is assumed to be 10.2° and directivity is 22.753dB. Find the aperture dimensions and sketch the E and H plane patterns.

5-Drive expressions for the E and H plane patterns of a rectangular aperture if:

$$E(x', y') = E_o \, tri\frac{y'}{b/2} \, \hat{x}$$

electric field in x direction

6- Drive expressions for the E and H plane patterns of the uniformly illuminated circular aperture with a center blockage as shown in figure.